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ABSTRACT

This document contains three papers presented at a symposium on partnership research moderated by Richard Torraco at the 1996 conference of the Academy of Human Resource Development (AHRD). "Partnership Research in HRD: Pulling Rabbits from Hats" (Ronald L. Jacobs) demonstrates that human resource development (HRD) researchers should adopt the partnership research approach (a research approach based on the principles that research problems should emerge from practice) and that each partner should gain something from the study. Laurie J. Bassi's paper "Partnership Research: Challenges and Opportunities" makes the following points regarding partnership research in HRD: research partners' conflicting needs must be carefully balanced against one another; given the difficulties inherent in partnership research, a compelling reason must be identified for doing research in partnership rather than in isolation; and researchers must develop up-front procedures for addressing the difficulties of conducting research in partnership. "University-Industry Partnerships: Meeting the Challenge with a High Tech Partner" (Lynn E. Nimtz, William C. Coscarelli, Daniel Blair) uses the example of the partnership currently existing between Southern Illinois University and Hewlett-Packard to explore the issues involved in university-high-tech industry partnerships. (MN)

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SYMPOSIUM
[29] PARTNERSHIP RESEARCH

Chair: Richard Torraco, University of Nebraska

Partnership Research in HRD: Pulling Rabbits from Hats
Ronald L. Jacobs, Ohio State University

Partnership Research: Challenges and Opportunities
Laurie J. Bassi, American Society for Training and Development

University-Industry Partnerships:
Meeting the Challenge with a High Tech Partner
Lynn E. Mintz, Southern Illinois University
William C. Coscarelli, Southern Illinois University
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Partnership Research in HRD: Pulling Rabbits from Hats

Ronald L. Jacobs
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Most agree that HRD research must be grounded to practice. Yet, unless new approaches to research are considered, this goal will likely remain an abstraction. Partnership research suggests that research problems should emerge from practice and that each partner in the endeavor, researcher and practitioner, should gain something from the study. Most notably, partnership research differs from the more traditional deductive approaches to generating problems. It also differs from action research in that there is a scholarly intent in doing the research.

Partnership research is the approach I use when deriving HRD research from HRD practice. The term partnership research was selected because it emphasizes the close relationship between HRD researchers and HRD practitioners. That is, each person should be meaningfully involved in the endeavor. But partnership research is more than having researchers and practitioners cooperate on a project. In this paper, I suggest that partnership research describes the inductive process used to generate research problems from HRD practice, irrespective of the inquiry paradigm or methodology that is subsequently used to carry out the research. Clearly, partnership research differs from the more commonly used deductive approach to generating research problems. The applied emphasis of HRD makes alternative approaches such as partnership research critical for advancing the field (Leimbach, 1995).

Partnership Research

Partnership research is the process of generating new knowledge through practice. Partnership research has two major attributes. First, as stated, research problems are derived from an analysis of HRD practice. This assumes that in nearly every instance of HRD practice, a research study is waiting to be exposed and conceptualized by an insightful researcher, who is attuned to recognize and appreciate such opportunities. Partnership research requires the HRD researcher to be directly involved in the practice in some way, often as an external consultant to the organization. At some point in the practice, the HRD researcher comes to realize that a broader set of meanings exist in the practice, which can be framed as a problem situation or issue. From that awareness, a more formal problem statement can be constructed.

Second, partnership research requires that both partners anticipate using the results of the research, even though each will use the information for different purposes. Consider that HRD researchers engaged in partnership research seek out practice opportunities to serve organizations and to find new research settings. Thus, HRD researchers primarily view the results as information to be shared with the field. At the same time, HRD practitioners seek out the services of HRD researchers because they are expected to bring with them expertise in specific areas of HRD practice, based on their previous partnership research experiences. HRD practitioners primarily view the results as information to be used exclusively in their organizations, though they recognize that the information may have general importance as well.

As stated, partnership research differs from the more common deductive approach to generating research, in which problems and methods are considered first, then suitable settings are sought out to conduct the studies. While this approach is acceptable and follows an established scientific tradition, unfortunately, practice seldom plays a substantive role at the beginning. Connecting the research and practice is usually considered later in the study. Partnership research also differs from action research. Action research encourages practitioners

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to use a data-gathering process to improve their practices, without concern necessarily for the rigor or generalizability of the results beyond the immediate practice setting (Argyris, Putnam, & Smith, 1985).

To summarize, partnership research uses practice as the platform to generate research. The results are used by practitioners to inform organizations and by researchers to communicate to scholarly audiences beyond the immediate setting. The underlying goal of partnership research is to improve practice and contribute to a scholarly body of knowledge, goals that are viewed here as being complementary rather than contradictory in nature.

Issues in Doing Partnership Research

While partnership research motivates a number of HRD researchers, including myself, it is not always possible to achieve. Numerous issues arise when doing partnership research. For instance, constructing research problems from practice is perhaps the most difficult aspect of partnership research. The researcher must be able to step back and view the situation from a higher level of abstraction, enabling the basic elements of the practice to be considered much more conceptually. Perhaps this skill should be included as part of HRD doctoral programs, since doing partnership research may be considered an essential skill for individuals at this level. Logically, partnership research concepts should also be included as part of HRD master's degree programs, since many advanced practitioners are prepared in this way.

Even if a research problem can be identified, the researcher must decide whether it in fact fits his or her own agenda. HRD researchers can in effect guide their research agendas through the practice opportunities that they agree to take on. Finally, partnership research is not appropriate in all instances or for all researchers. Some studies require more planning and control than what partnership research might afford. Partnership research often requires greater flexibility and ingenuity to fit the research plan to existing situations. And some researchers may feel uncomfortable entering organizations as practitioners first, since either their skills or interests do not follow in this way.

Pay-Offs of Partnership Research

The incentive is that partnership research can yield high pay-offs for both partners. Consider that a study to compare the financial benefits of unstructured and structured OJT originated from the larger need to justify the time and cost demands of using structured OJT. The study served to inform management about the financial benefits of structured OJT, information that helped position the practitioner more strategically in the organization, and it extended the use of a financial forecasting model in a way unique to the literature (Jacobs, Jones, & Neil, 1992).

Other examples of partnership research include a study to compare an employee selection process for large groups versus individuals, which came originally from a company request to validate the selection process (Carr & Hruby, 1995). Freer, Terminello, & Clossman-Wright (1995) reported on the desirability of using context-bound approaches for developing workplace literacy materials, after developing such materials for employees in an automotive supplier company. Finally, a needs assessment by Jacobs and Washington (1992) in a large regional bank resulted in identifying the construct called, planned employee development, which is now the focus of a research project to determine its relationship with organizational outcomes.

Conclusion

Doing partnership research loosely suggests the analogy of a magician performing the trick of pulling a rabbit from a hat. The magician (the HRD researcher) announces that a rabbit is

actually in the hat (an HRD research problem is actually in the HRD practice), even though the audience is shown the hat and no rabbit is apparent. Then, after saying a few magical words, the magician reaches into the hat and pulls out the wiggling rabbit (a problem statement of value to both partners). Without considering approaches such as partnership research, I suggest that important opportunities to advance the field are being lost, simply because HRD researchers may unnecessarily separate their research and practice activities. HRD researchers engaged in partnership research often find more research rabbits in their practice hats, than what others might believe.

As a community of HRD scholars, our challenge is to generate new knowledge through research. To engage in practice and, at the same time, do research on the practice, which contributes both to organizations and to the HRD literature, should be considered a laudatory scholarly ambition. The coming together of researchers and practitioners to achieve these complementary goals is the essence of partnership research.

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Partnership Research: Challenges and Opportunities

Laurie J. Bassi
American Society for Training and Development

Doing research in partnership with others is a dicey but potentially rewarding business. At a minimum, it requires that the (almost always) conflicting needs of the partners be carefully balanced against one another. Given the difficulties involved, there must be a compelling reason for doing research in partnership, rather than in isolation. Developing a clear understanding of these difficulties, along with up-front procedures for addressing them, is essential for successful partnerships.

Partnership, according to Webster, "is a contract entered into by two or more persons in which each agrees to furnish a part of the capital and labor for a business enterprise and by which each shares in some fixed proportion in profits and losses." Even at this level of abstraction, some of the challenges inherent to partnership are readily apparent. What portion of the necessary capital and labor should each partner furnish? And how should that portion be tied to the profits, or in the worst case, losses?

Whatever difficulties exist in answering these basic questions about partnership in a world where outcomes can be anticipated with reasonable certainty, those difficulties are compounded in a world with uncertainty. And anyone who has been at research long enough to get through graduate school has almost certainly learned that the business of research is a highly uncertain one.

These observations, while quite general in nature, can nonetheless go some way toward providing a framework for thinking about partnership research on human resource development issues. Before developing a set of principles for guiding partnership research, it is useful to delineate the perils and opportunities inherent in partnerships.

This is a topic that is of considerable interest to the American Society for Training (ASTD), where I serve as the Vice President for Research. But since I have worked in that position for less than two weeks, the issue of how ASTD's research department will approach partnership research is, to say the very least, not yet well established. Consequently, this represents a fine opportunity for establishing a framework that can be used for establishing promising research partnerships.

Why Bother? Who Needs It?

Good partnerships, like good marriages, don't happen by chance. They require (at a minimum) work, thought, communication, good will, tolerance, and forgiveness. They are unlikely to last for long if the distribution of rights, responsibilities, and rewards is too lopsided. And yet when they work well, partnerships are able to produce more than the sum of their parts. It is this possibility that causes partnerships to come into existence, despite the rather formidable list of attributes required to make good on this possibility.

Researchers, however, are by and large an introverted lot. So by their very nature, many researchers are not inclined to participate in work carried out in partnership with others. Furthermore, the incentive structures that most researchers face tend to dampen enthusiasm for

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partnership research. Most researchers -- especially those in academe -- are rewarded, in large part, based on their individual research productivity.

On the other hand, the complexity of much human resource development research fosters incentives to collaborate. In many research applications, no single discipline, much less a single researcher, can adequately address this complexity. Furthermore, the sheer volume of information (data) required to develop meaningful conclusions promotes partnership. This is not a field (like theoretical physics) where valid insights can be developed by one person sitting in front of a computer screen.

In sum, the reasons (indeed, the necessity) for attempting collaborative research probably more than outweigh the reasons for not doing so.

Partnering With Whom?

The three major candidates for partnership are firms, professional organizations (such as ASTD), and academics. Government could (if it had the resources and the will) play a facilitating role, but virtually no government agency has the people-power to be an active participant in human resource development research.

In most cases that I can imagine, an ideal collaborative research project would include all three types of players. Firms are where the action is. For many types of research, the cooperation of firms is an absolute necessity. They often have valuable data already in hand, and certainly could facilitate the collection of other data that they do not have readily available.

Academics come with inquisitive minds, a tool kit full of useful methodologies and, in most cases, no ax to grind. Together, this gives them credibility, an absolutely essential element in partnership.

Most (although certainly not all) academics are, however, short on a supportive infrastructure, a critical mass of like-minded colleagues, and access to firms. ASTD's research department, while by no means an enormous organization, can provide some support on each of these fronts. But just as is the case for most academics, ASTD's research department is not large enough to mount a major research initiative without partners. It is, however, in a good position to serve as a facilitator, bringing together groups of academics and firms.

What's In It For Each Of The Partners?

Self-sacrifice is a poor foundation for partnership. A necessary condition for successful collaborative efforts is that all partners are made better off by their participation. While this condition need not be satisfied at every moment during the life of a partnership, the players must certainly perceive that it will hold true over the life of the partnership. Certainly, this perception must exist at the beginning of a partnership, or else the partnership will never come into being in the first place. That is to say, each of the partners must get something out of it.

The firms participating in the collaborative effort must have a reasonable expectation that the collaboration will produce information that can be used to improve the firm's performance. Not incidentally, firms must also be convinced that the collaboration will not produce harmful information.

Academic researchers need a reasonable expectation that the collaborative effort will result in high quality, rigorous research that can be translated into scholarly products.

ASTD's condition for participating in collaborative research is that it must produce information that is either of immediate interest to its members, or of long-run value to ASTD's vision of itself as a leader in its field.

Each of the partners needs to be convinced that the results of the collaborative effort will be better than those that could be achieved in isolation. Furthermore, the results need to be produced within a relevant time frame (e.g., well before a tenure decision for junior academics, or while it can still inform decision-making within a firm).

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Deal Breakers

Structuring research partnerships as a win-win situation is difficult, but essential. There are several stumbling blocks that will predictably get in the way of partnership. These include: the need for the research to be sufficiently generalizable, the need for the research to be sufficiently specific, and concerns about proprietary information.

From the perspective of academics and ASTD, research is only useful if it is generalizable. This typically requires that many specifics be ignored for the sake of developing insights that have applicability across a wide variety of circumstances.

From the firm's perspective, however, the "devil is in the details." They are clearly interested in understanding the specifics of how and why things do or do not work in the particular circumstances that they face. In other words, generalizable results are much less valuable to firms than they are to the research community.

Balancing the needs of some of the research partners for generalizability against the need of other partners for specificity is obviously a delicate but crucial issue for research partnerships.

Another potential deal breaker in structuring partnership research is access to and the use of proprietary information. This is particularly true when it is firms' outcomes that are being studied. But concerns about proprietary information can become a stumbling block even in cases where it is firms' processes (as opposed to outcomes) that are the subject of research. As firms increasingly walk the talk that "Our people are our most valuable asset," disaggregated, detailed information about human resource practices within the firm (e.g., evaluation of teams and its relationship to reward systems) is likely to be considered proprietary. While a firm might agree to make general information available about these practices (for the purpose of comparing itself to others), the more general is the information, the less likely it is to be valued by the firm. Herein, lies a catch twenty-two. Concerns about access to proprietary information will reduce firms' willingness to provide detailed, specific information to the research partnership. But if the information is provided at a highly generalizable level, its value to firms -- and therefore, their interest in participating -- is diminished.

Deal Makers

Given the many reasons for research partnerships not to exist, there has to be some compelling reason if they are, in fact, to exist. In our line of research, it seems to me that the compelling reason is that the world is simply too complex and evolving too quickly for individuals working in isolation to be able to understand and react intelligently to the circumstances in which they find themselves.

The trick, then, is that research partnerships must produce information that is of sufficient specificity to be of value to firms, but sufficient generalizability both to ameliorate firms' concerns about access to proprietary information and to be of value to researchers. Benchmarking research, with which ASTD has now developed several years of experience, provides at least one mechanism for achieving this balance.

Benchmarking provides a forum that enables firms to compare themselves to other firms, using a variety of measures that are important to firms, but typically not available in a comparable form across firms. To date, ASTD's experience with benchmarking has been limited to measuring training within firms. But the mechanism looks sufficiently promising that it is reasonable to think that it could be applied to other important research issues. Most important among these, perhaps, is the relationship of training (as well as a wide variety of other human resource practices) to firms' performance.

When properly designed, benchmarking has the added advantage of serving as an valuable networking device for those who participate in it. The value that participants derive from networking can help to smooth over some of the inconveniences and annoyances that are an inevitable part of the networking process. In essence, networking becomes an important byproduct of the research partnership. In some cases, it many be the primary benefit that some of the

partners -- especially firms' representatives -- derive from the partnership. This function, well orchestrated, may enable a nurture research partnerships that would otherwise be untenable.

Principles for Partnership Research

The following principles emerge for structuring research partnerships:

1. There must be a compelling reason for the research to be done in partnership.

2. The research must be structured to balance firms' need for specificity against their own concerns about access to proprietary information and researchers' need for generalizability.

3. Agreements about how resources will be used and who has ownership of research products should be developed before the work is underway.

4. High levels of integrity of all parties involved is essential, particularly when proprietary information is in question.

5. Providing ample opportunities for networking can help smooth over some of the annoyances and inconveniences that are inevitable in partnerships.

University-Industry Partnerships: Meeting the Challenge With a High Tech Partner

Lynn E. Nimtz and William C. Coscarelli
Southern Illinois University

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Today's knowledge-based, technological society demands much of both its educational resources and the corporate world, demands that are often met through effective university-industry partnerships. This paper will explore the issues involved in such partnerships and examine a partnership that currently exists between Southern Illinois University and Hewlett-Packard.

Recent years have seen both higher education and the corporate world faced with challenges that demand fresh and creative solutions. As America has moved into the global marketplace, it has undergone a transformation from an industrial to a knowledge-based, technological society which, as documented by the Hudson Institute in *Workforce 2000,* calls for an educated, highly skilled work force. At the same time, universities are faced with the challenge of rising costs and funding problems at both the state and federal levels. It is the combination of these pressures that traditionally has brought higher education and industry into symbiotic alliances that have been mutually beneficial but which also present unique challenges. Cultural differences as well as leadership styles, legal issues, institutional policies, and cycle time concerns are just some of the issues that must be resolved if university-industry partnerships are to succeed. But corporations such as Hewlett-Packard "recognize the important role higher education plays in determining the course of the future by educating today's and tomorrow's workforce, and by developing new knowledge and technologies" (Hewlett-Packard).

In the introduction to their text on managing partnerships between higher education and industry, Matthews and Norgaard (1984) quote from Lewis Thomas' perspective on the nature of partnerships, "The urge to form partnerships, to link up in collaborative arrangements, is perhaps the oldest, strongest, and most fundamental force in nature....We should go warily into the future, looking for ways to be more useful, listening more carefully for the signals, watching our step, and having an eye out for partners." The realization that such partnerships are vital to the life of the university as well as to the future success of industry and the cautionary steps that must be taken when entering into a partnership are lessons that have had repeated exposure as universities and industries have formed alliances in diverse ways to meet a variety of needs. This paper will explore such lessons with a brief historical perspective on the growth of the partnership movement followed by a consideration of the issues that surround university-industry partnerships. It will conclude with a discussion of a partnership that currently exists between Southern Illinois University and the Hewlett-Packard Company.

Historical Perspective

Tracing the progress of the development of university-industry partnerships, it becomes clear that such alliances have had a long and varied history. Bowie (1994) follows their development from the early 1900s through the 1980s beginning with a discussion of the Wisconsin Alumni Research Foundation (WARF), a nonprofit organization founded in 1925 to support the research efforts at the University of Wisconsin. Since WARF was technically separate from the university, it was

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able to accept private funds from business and could award royalties to faculty for patents on products they invented. According to Bowie, WARF is an early example of the problems that can develop from university-industry partnerships as evidenced by how it handled the licensing agreements for a patent created by Professor Henry Steenbock who published research which eventually led to the irradiation of food to activate Vitamin D (and elimination of the childhood disease known as rickets). Because Steenbock was concerned that granting an irradiation license to the oleomargarine industry would hurt the dairy industry, WARF withheld the license for many years until it was brought to court on antitrust charges by the federal government. In another example of the early relationships between higher education and industry, Bowie described the partnerships that have existed at the Massachusetts Institute of Technology since the early 1900s that began with support from companies such as AT&T and Edison GE. It also stands as an example of the ongoing struggle between supporting basic and applied research which led to the creation of two semiautonomous laboratories supported by research contracts with industrial companies and trade associations. In spite of some early challenges, corporations continued to be major sponsors for industrial research in university laboratories throughout the 1930s and 1940s.

In addressing the national policy formation process in higher education, Slaughter (1990) describes how industry sponsorship has waxed and waned in relationship to the federal government's role in higher education. Following the heavy influence of the 1930s and 1940s, private industry's support for research diminished after World War II to be replaced by increasing support from the federal government through the 1950s and 1960s. Another shift took place in the 1970s when a number of large contracts were signed between research universities and industry at a time when the nation was in the throes of a recession and federal monies were being cut for research programs. The trend for industry support continued through the 1980s at the same time that a number of organizations appeared on the scene in response to concerns for the nation's ability to compete in the global marketplace. Organizations such as the Business-Higher Education Forum, the Carnegie Forum on Education and Economy, the Government-University-Industry Research Roundtable, and the President's Commission on Industrial Competitiveness are just a few examples of organizations that address policies related to industry-university-government relations.

In their observations of the transition in this society from a capital intensive, physical-resource based economy to a knowledge-intensive, human-resource based economy, Matthews and Norgaard (1984) suggested this transition called for a new strategy. Knowledge and information were to become the strategic and meliorating resources of society and would demand much of the strength of basic research and technological resources. In this scenario, education assumes a critical role in the economy's infrastructure, and cultivating the relationship between higher education and industry becomes essential. A solid example of such a role is apparent in the creation of Pascal by the University of California - San Diego. Pascal was the first learning tool in structured programming, and it became a standard for the new generation of software. Stankiewicz (1986) goes further to suggest that if these alliances between universities and industry are to be successful, then universities themselves must undergo a cultural and organizational change that will move them in a position to play a decisive role. With this in mind, it would do well to consider in general terms how the existing university culture and organization impact industry partnerships.

Cultural and Organizational Challenges of University-Industry Partnerships

While the exigency of university-industry partnerships is well grounded in the technological demands of a global marketplace, the challenge of managing such alliances must be understood in view of the benefits as well the risks they entail. Fundamental to this discussion is understanding the role that the university should assume in partnership with industry, particularly when research is the focus of the alliance.The Government-University-Industry Research Roundtable (1991) published a summary of interviews with senior industrial research managers from seventeen major corporations. Most industry officials interviewed expressed the belief that university scientists do

not share the same perspective regarding technical advance as their counterparts in industry who perceive it as occurring "most often through small incremental improvements to existing products and processes rather than as large technical breakthroughs" (p. 1). According to the interviewees, "universities play a small role...because university scientists often tend not to operate on or understand industry's short-term schedules or the tools involved in developing an incremental improvement" (p. 1). Peter Boer of W. R. Grace and Company commented that industrial scientists "are better than academics at seeing the broader scope and the long-range outcome" and supports the opinion of other interviewees that industry's culture "fosters entrepreneurial awareness of profitable emerging fields and ideas" (p. 2).

It is cultural differences such as these which are fundamental to the nature of university-industry partnerships. While it might at first appear that these differences would serve to limit the university's role in research, an enormous amount of ongoing research is being conducted at universities in partnership with industries that continue to rely on the knowledge base that supports incremental technological advances as well as breakthrough discoveries. Universities continue to provide a depth of knowledge and techniques that industries can exploit in order to solve problems or produce effective designs.

Matthews and Norgaard (1984) have given considerable attention to the symbiotic relationship that exists in university-industry partnerships while, at the same time, paying heed to some of the risks that may be involved. The following table summarizes some of the possible benefits and risks they and others have identified for both the university and the industry.

Table 1. Benefits and Risks of University-Industry Partnerships

University	Industry
Benefits	
• Additional funding sources for faculty salaries, research and programs • Access to technical and physical resources • Diffusion of technology from a central source of expertise • New resources attractive to prospective faculty • Enhanced institutional curriculum • Student/faculty exposure to real problems that test theories • Carryover strengthens university core programs	• Access to a skilled and adequately trained work force • Access to new windows on research • Ability to influence research directions and educational programs • Substantial tax advantage • Enhanced company image
Risks	
• Undue influence by industry on direction of future programs and research • Conflicts of duty and commitment • Inhibited intellectual freedom and right to publish • Research takes precedence over teaching responsibilities	• Diminished control over proprietary information • Lack of relevant research produced • Measurable return on investment • Consumption of infrastructure resources

Additionally, both environments in such a relationship experience the trans-benefit of a diversity of thinking and paradigm challenges.

A number of scholars have addressed the problems of research partnerships and are

confident that the benefits outweigh the risks, many of which can be avoided if there is a clear understanding of the roles that must be assumed in a university-industry partnership and if ample consideration is given to the cultural differences between the partners. Fairweather (1991) has identified six principal factors which he believes crucial to the success of research partnerships: understanding cultural differences; leadership; organizational structure; legal issues, institutional policies, and contractual mechanisms; capacity and resources; and faculty workload. Cultural differences and legal issues, institutional policies, and contractual mechanisms warrant further examination at this time.

In addition to differing perspectives on the nature of technical advance as previously mentioned, cultural differences between higher education and industry are manifested in both their mission and methods of operation. In most cases the mission of the university is to balance the goals of education and training with research and service, while the dominant goal of industry is to make a profit. Corporations may form an alliance with higher education in order to gain a competitive edge in the marketplace, but universities are more likely to be concerned with research and the publication of results.

Methods of operation may differ as well, though this is not so clearly defined. Some academic institutions struggle with bureaucratic red tape, while others are at least partly decentralized and allow faculty to control curriculum content and influence tenure and promotion decisions. Most corporations traditionally operate under hierarchal, top-down decision making structures, but some such as Hewlett-Packard work from a decentralized team approach. When interviewed by the Government-University-Industry Research Roundtable (1991), Joel Birnbaum of Hewlett-Packard spoke of his concern for the competitive culture of the university which trains its students to compete for grades and top honors when what is needed in his company are individuals who have learned to be part of a team approach.

Additionally, in regards to operation, universities and industry differ markedly in their perception of time. Higher education generally operates under long-term strategic plans, and individual departments within a university often consider research activities on a long-term basis. Industry, however, operating under the profit motive, cannot afford a delay between research and its application to the marketplace. This disparate work ethic offers a challenge to research partnerships since the collegiality of the university environment relies heavily on a long term sense of precedence, committee structure, debate and discussion. Industry, on the other hand, is market-driven, facing the pressures of the life and death struggles demanded of it by the marketplace.

Fairweather (1991) suggests that such differences in methods of operation and mission could be resolved if both industry and universities would seek alliances with partners that operated under similar management styles and if academic leaders sought to create "innovative organizational structures to preserve the integrity of the parent organization while permitting the use of management techniques more relevant to the success of the research partnership" (p. 9). A number of industrial officials interviewed by the Government-University-Industry Research Roundtable (1991) suggested that a key ingredient to overcoming such obstacles was to use the "bottom-up approach" to partnerships where the initial contact is made between a scientist or researcher from each sector as opposed to the "top-down approach" when it is made by senior administrators.

No matter how the initial contact is made, before any work can proceed, legal issues, institutional policies, and contractual mechanisms must be resolved. As indicated in the risk factors found in Table 1, partnerships may raise the issues of intellectual freedom and the right to publish what may constitute proprietary information. In addition, issues with regards to rights to patents, royalties and licensing fees may need to be resolved if the partnership is to succeed. Most institutions have prepared contractual agreements which translate university policy into guidelines for faculty and administrator participation in partnership arrangements. It then is left to the legal departments of the university and industry involved to see that these issues are resolved to the satisfaction of both organizations.

Southern Illinois University - Hewlett-Packard Partnership

In spite of the challenges facing university-industry partnerships, many types of cooperative arrangements are currently in place serving a variety of needs. One such partnership was formed in August 1995 between Southern Illinois University at Carbondale (SIUC) and the Hewlett-Packard Company (HP). Before describing that alliance it would do well to provide some background on the participating organizations. Located in the southern tip of Illinois, SIUC is a comprehensive doctoral institution with an average total enrollment of approximately 24,000, including more than 4,400 graduate/professional students. Ranked by the Carnegie Foundation as a Research II institution, annual support from public and private agencies for research, training, and service projects exceeds $40 million. Competitive research grants account for more than $20 million of the total. SIUC has taken a leading role in a number of research areas important to the economy of Illinois and the nation, including coal research and clean coal technology, materials science, acquaculture, groundwater quality, and neuroengineering. SIUC supports various types of university/industry research agreements including grants, grants-in-aid, contracts, fixed-price contracts, cost-reimbursement awards and cooperative agreements.

Recently named by *Forbes* magazine as the outstanding corporate performer of 1995, HP is an international corporation with revenues totaling $31.5 billion in 1995, The company which began operations in a garage shop in Palo Alto, California, in 1938, has become the biggest maker of computer printers and ranks number six in the highly competitive personal computer market (Wechsler and Upbin, 1996). HP's top-down structure and team approach have helped to create largely autonomous divisions within the company that retain responsibility for strategic decision making. The company has invested heavily in research and development, having spent $2.4 billion in 1995.

The initial contact for the alliance between SIUC and HP followed the "bottom-up approach." Having identified a need for a breakthrough in the testing principle of certification of HP employees, Daniel Blair, Manager of HP Technologies and Systems, initiated a search for someone who was an expert in the field of testing. Blair contacted Bill Coscarelli and Sharon Shrock at SIU, having recalled reading the work of this pair who together through publishing have established a reputation in higher education and business for leadership in the field of testing. Agreement was quickly reached between the principal players as to the nature of the partnership, and a contract was drawn up. Once HP gave their approval, the contract was submitted to SIUC's Office of Research Development and Administration and after about ten days, final signatures were in place for a contract that would run from August 1995 through June 1996.

While not considered a strictly research partnership, the alliance between HP and SIUC demonstrates the advantages that can accrue for both partners and provides examples of the cultural and organizational challenges that must be resolved if a partnership is to succeed. From HP's perspective, by contracting with SIUC, they have satisfied an existing need that had to be met either by hiring new staff who were trained in testing procedures or by going outside the ranks of the HP staff to contract with testing consultants. The latter option was the more cost effective, and they were able to purchase the services of experts skilled in the knowledge they were seeking.

SIUC has profited in turn from the partnership with HP in a number of significant ways. First and foremost is the opportunity this presented to work with a high tech corporation, particularly for the graduate students who are receiving valuable on-the-job training with a company that holds a prominent place in the corporate world. The partnership brought additional funding sources to the university for faculty and graduate salaries as well state-of-the-art equipment. While SIUC has an established reputation for research roles, the partnership with HP is a significant addition to the university's record of achievement.

While both organizations have clearly benefited from the partnership, they have done so by facing the challenges that surface when the culture and organization of the university and industry come face to face. And in this instance, the importance of culture was expressed through the language of the corporate world. The first conference calls between Coscarelli and the staff at HP caused some initial hesitation as he found himself having to adapt to the language that was more in line with the corporate experience. For example, when doing a needs assessment,

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members of the HP staff responded stiffly to questions about "their knowledge of testing" but loosened up immediately when the language switched to asking "their opinion." Given HP's international scope, language continues to be a factor in the designing of printed materials as these must be sensitive to English-as-a-second language issues.

The issue of time quickly emerged in this partnership. Three months is almost forever in the high tech world, but the university bureaucracy is incredibly slow. While the contractual agreement itself was arranged expeditiously, legal issues and internal billing issues continue to surface and while they have not impeded the progress of meeting HP deadlines, they have certainly added to the workload of the staff as they seek to resolve the problems. For example, for over three months an attempt has been made to obtain a corporate account with a major internet provider, but the legal wranglings of the university bureaucracy combined with the difficulty of pinning down a single contact person for the internet provider who could help resolve the problem has left the account application as yet unresolved.

In other matters relative to time, the university calendar with its semester and holiday breaks is challenging to an industry that may close only for major holidays. So to is the concept of part-time office hours which are quite customary in the university setting but almost unheard of in the corporate world. Coupled with the constraints of working within different time zones, the time issues underscored the reliance on voice-mail and e-mail as a major form of communication.

Another factor which presented an immediate challenge to operating within the partnership from the SIUC perspective is the diversified nature of HP. The company is dispersed throughout the world and available, for the most part, only electronically. "Corporate entropy" is the most apt description for the challenge this presented. One literally owns the problem and continues to push until it has been resolved. Working within such an environment, there are also many more opportunities and pressures to derail issues that do not fall under what Blair refers to as the "tyranny of the urgent." Using the metaphor of the backpressure of an engine, a problem's resolution may never get rolling since within a business there is no such thing as momentum in the long term.

The electronic nature of this working arrangement raised concerns for HP as well in regards to securing the transfer of data between the respective agencies. Secure communications networks had to be established and precautions taken on SIUC's part in an environment that generally tends to be quite open.

As mentioned previously when looking at the risk factors involved in university-industry partnerships, the issue of proprietary commitments becomes significant in that it prevents the publication of work related to the grant project. Such is the case with this partnership and though the experience of working through the problems presented by this company or any company in such an alliance challenges one's resources to solve them and expands one's expertise in so doing, the opportunity to publish work directly related to the project is denied. At the same time, the industry involved must safeguard its product line, and in this case HP found it necessary to hold SIUC to a proprietary commitment.

Conclusion

Having met and continuing to manage the challenges of working in partnership, representatives of both SIUC and HP would agree that the advantages far outweigh the disadvantages or risks such an alliance involves. Historically, such partnerships have flourished in spite of the challenges brought on by the cultural and organizational differences between industry and universities. They have flourished because both parties have found the alliance to be mutually beneficial. Corporate and university politics may be horrendous and both environments may function with different realities and different dimensions of time, but if you are going to have high tech, you are going to have high touch. The SIUC-HP partnership is but one more example of how such a partnership succeeds by meeting the challenges head on and adapting the approach of higher education to meet the demands posed by the cultural and organizational structure of industry.

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